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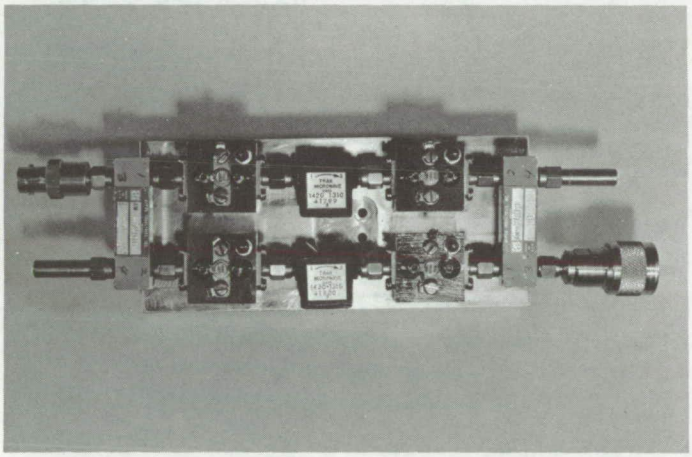
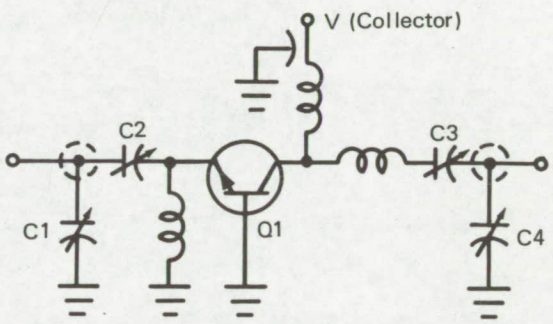
NASA TECH BRIEF

Goddard Space Flight Center

Discrete-Component S-Band Power Amplifier

A compact, discrete-component S-band power amplifier delivers 8 W at 2.3 GHz. The amplifier uses low-Q input and output circuitry incorporating four variable air-dielectric capacitors which are mounted in a 2.54 cm (1 in.) cube of a nickel plated aluminum alloy. Two of the capacitors, C2 and C3 (see fig.), are mounted as close as possible to the emitter and collector leads of transistor Q1 in order to minimize lead length.





2 to 3.3 GHz Discrete Component Amplifier

The amplifier is tuned by varying the capacitances of C1, C2, C3, and C4. This enables complete impedance matching of the input and output, and eliminates the need to custom select the transistors, which is a requirement for strip-line amplifiers.

With the transistor soldered directly to the amplifier housing, the amplifier showed the following performance improvements over conventional designs: increased power output, decreased likelihood of parametric oscillation, and increased temperature stability. With the entire housing then mounted on an aluminum heatsink suspended in air, the transistor operated for 1900 hours at a collector voltage of 28 Vdc, an average junction temperature of 443 K (170° C), and an ambient temperature of 343 K (70° C). RF power output under these conditions was 5.5 W at 2.3 GHz. When the collector voltage was increased to 30 Vdc, the transistor operated for 220 hours. Average junction temperature was 501 K (228° C), ambient temperature was 367 K (94° C), and RF power output was 4.0 W at 2.3 GHz.

When the ambient temperature was maintained at 298 K (25° C) and the average junction temperature was 386 K (113° C), the RF power output increased to 8.0 W at 2.3 GHz with a collector voltage of 28 Vdc.

(continued overleaf)

Note:

Requests for further information may be directed to:

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Reference: B71-10365

Patent status:

No patent action is contemplated by NASA.

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(GSC-11248)